

Superfund program director discusses mining waste solutions in Armenia

By Sara Mishamandani

With its years of lessons learned from basic research and applications in the field, NIEHS-funded Superfund Research Program (SRP) remediation of toxic waste sites has emerged as a model for countries around the world.

Understanding how to keep metals from spreading to communities adjacent to toxic waste sites, and reversing the damage in nearby land, are what inspire [Raina Maier, Ph.D.](http://superfund.pharmacy.arizona.edu/content/ua-srp-investigators-and-staff-directory), (<http://superfund.pharmacy.arizona.edu/content/ua-srp-investigators-and-staff-directory>) director of the University of Arizona (UA) SRP, and an expert in environmental microbiology. As part of SRP commitment to outreach, Maier is eager to share findings from research at former mining sites in the southwestern U.S. and northern Mexico with scientists facing similar situations in their own countries.

During the International Scientific Symposium on Emerging Issues in Environmental and Occupational Health: Mining and Construction in Transition Economies April 22-23 in Yerevan, Armenia, Maier presented her research on [Phytostabilization of Mine Tailings: Metal Speciation and Dust Suppression](http://eoh2013.aua.am/files/2013/04/Phytostabilization-of-MineTailings_MetalSpeciationDustSuppression_Raina-Maier.pdf), (http://eoh2013.aua.am/files/2013/04/Phytostabilization-of-MineTailings_MetalSpeciationDustSuppression_Raina-Maier.pdf) a process by which plants remove, detoxify, or stabilize toxic substances.

The [international symposium](http://eoh2013.aua.am/), (<http://eoh2013.aua.am/>) sponsored by the American University of Armenia, Collegium Ramazzini, NIEHS, and others, was designed to raise awareness of health issues related to the mining industry in Armenia. The meeting brought together occupational and environmental health scientists, to advance understanding of how to protect worker and community health in the region.

Mining is important to the Armenian economy, but there is increasing recognition of the negative effects of mining on human and environmental health, and awareness that existing environmental regulations are not currently well enforced.

Applying Superfund research to Armenia

After describing the purpose and goals of the SRP to her audience, Maier presented her research on phytoremediation of mining wastes, also called mine tailings. Mine waste often contains toxic metals, which people can inhale through dust. In Arizona, Maier and her colleagues have identified suitable native plants and conditions that allow them to grow where mine contamination is found. The plants stabilize the tailings, keeping them from spreading long distances through wind erosion. These plants also help detoxify the land, by stabilizing toxic metals in the root zone.

Maier also discussed informational materials developed by UA that are used to educate and inform affected communities near mining sites. She gave examples with UA SRP informational fact sheets for community members, such as [What Are Mine Tailings?](http://superfund.pharmacy.arizona.edu/sites/superfund.pharmacy.arizona.edu/files/default_files/Information_Sheets/MineTailings/web_mine_tailings.pdf), (http://superfund.pharmacy.arizona.edu/sites/superfund.pharmacy.arizona.edu/files/default_files/Information_Sheets/MineTailings/web_mine_tailings.pdf) [What Is Arsenic?](http://superfund.pharmacy.arizona.edu/sites/superfund.pharmacy.arizona.edu/files/default_files/Information_Sheets/Arsenic/What_is_arsenic.pdf), (http://superfund.pharmacy.arizona.edu/sites/superfund.pharmacy.arizona.edu/files/default_files/Information_Sheets/Arsenic/What_is_arsenic.pdf) and [Lead and Our Health](http://superfund.pharmacy.arizona.edu/sites/superfund.pharmacy.arizona.edu/files/default_files/Information_Sheets/Lead/web_Lead.pdf). (http://superfund.pharmacy.arizona.edu/sites/superfund.pharmacy.arizona.edu/files/default_files/Information_Sheets/Lead/web_Lead.pdf)

After Maier's talk, a faculty member from the American University of Armenia expressed interest in initiating phytoremediation field trials at mining sites in Armenia. A future collaboration on this project is now in the planning stages. University students said that they would like to translate existing UA SRP informational materials into Armenian, for use in local communities.

"Armenia is a beautiful country and faces the same environmental challenges associated with mining that are found in other



Maier and her group have translated research on biological factors and processes influencing the transport and fate of bacteria and contaminants in the environment into the development of potential biomedical and environmental applications. (Photo courtesy of UA)



The smelter smokestack in operation in Akhtala, Armenia, spreads lead and other metals onto surrounding land. (Photo courtesy of Raina Maier)

places of the world,” said Maier. “I look forward to working with the American University of Armenia to begin to address those challenges.”

Health implications in the community

Maier participated in a field trip to Akhtala, Armenia to see a smelter in operation, and learn about local conditions and environmental concerns related to mining development. An elevated smokestack was installed at the smelter in 2010, in an attempt to reduce the amount of lead in local soil, but it has instead resulted in further spread of lead throughout the valley. Lead exposure creates a serious neurological health risk, especially to children.

“The movement of lead from the smelter emphasizes the need to better understand what mining workers and surrounding communities are being exposed to,” said Maier. “It also shows us how important it is to stabilize mining waste and keep it from affecting local communities.”

(Sara Mishamandani is a research and communication specialist for MDB Inc., a contractor for the NIEHS Superfund Research Program and Division of Extramural Research and Training.)



Environmental health science experts from around the world participated in the international scientific symposium. Shown in the front row, seated left to right, are Karyl Norcross Mehlman, M.D., Ph.D., of the Mount Sinai School of Medicine; Morando Soffritti, M.D., of the Ramazzini Institute; and Varduhi Petrosyan, Ph.D., of the American University of Armenia. (Photo courtesy of Raina Maier)

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